VARISTOR AG

Partner und Spezialitäten

VEBA

Company Ve.Ba. is a co-operative of growers founded in 1971. Our job is processing fruits in order to offer to the food industries a full range of raw materials for all possible applications:

AIR-DRIED PRODUCTS
Dehydrated LM Apples and CD Apricots, Peaches, Pears and Plums The main characte types of products are as follows:
low moisture content (<5 % for apples and <8 % for summer fruits)
natural colour, smell and taste of the fresh fruits
no addition of colorants, flavours or aromas
capacity of the fruit dices to fully rehydrated back to fresh pieces of fruits, still raw
constant quality and no waste
different cut sizes for the different applications
long shelf life .i.e. at least 12 months
easy way of storage and transport

zurück zu Partnern

Applications for these products:
1. Yoghurt-fruits
2. Bakery products: pies, strudel, Danish and little pastry, croissants and so on
3. Biscuits
4. Breakfast cereals
5. Confectionery items
6. Baby foods

Before **use** in the bakery products, it is needed to rehydrate these items with water and eventu ingredients, such as sugar, starch, **pectin**. Instructions, time and ratio as per relevant Specifica

Convenient products out of LM Apples and CD Apricots, Peaches, Pears and Plums
Using these types of products as basis, we have developed the so-called convenient products, bags of 1250 gr., made by 50 % or more fruit dices and 50 % dried **binder** (starch, sugar, **pec** characteristics are as follows:

small size packaging
extremely easy way of **use**
save of time and money for the preparation of the filling
perfect stability while cooking
always constant and granted results at the highest quality

possibility to personalise both the recipes and the packaging as per Customer

Application for these products:
- by the bakery shops and Konditorei for the preparation of:
1. fruit pies
2. Danish pastry
3. strudel
4. filled croissants

These items must be rehydrated with water before use but they do not need any other addition starch or sugar. The personalisation of the filling through the addition of raisins, nuts, or simil possible. Instructions, time and ratio as per relevant Specifications.

Special products out of LM Apples and CD Apricots, Peaches, Pears and Plums
Using again these two types of products as basis, we have developed a full of range of special rehydration levels, with the following characteristics:
soft, chewy textures also after cooking
no clumping risk
flexibility, as far as the moisture content is concerned
not freezing at –20° C

Applications:
1. bakery, filled products, especially croissants
2. ice creams
3. confectionery items
4. chocolate pralines

These products are ready to be used as they are and they do not need any special preparations, required by the customer's technology.

ASEPTICALLY PACKED PRODUCTS
Using as starting point fresh fruits only through innovative, high tech process, we are produci fruit pieces, which can be divided in 2 main groups:

Aseptic peach and pear dices in light syrup and apricot and apple dices in water
The main characteristics of this type of products are as follows:
high quality of the fruit dices, which have been processed only once and quickly
therefore, still good and form texture of the fruit dices
long shelf-life
no bacteriological problem
good relation between the fruit content and the syrup or water content
flexible packaging (10 and 20 kg bag in box or 200 kgs bag in drum)
absence of dangerous packing stuff, such as cans – following absence of risks of event – and subsequent easy garbage discharge

Applications:
1. fresh pastry, such as Danish, croissants, small pies and so on
2. fresh dessert
3. fruit salads
4. creams and ice-creams
5. fresh mixed salads with mayonnaise, cheese or similar products
6. yoghurt-fruits
7. special cheese
8. baby food

Before use, normally these fruit dices are separated from the syrup or the water, and the liquid powders or starch, can be use as a binder of the fruit dices.

Aseptic ready to use pie mixes: apples, apricots, peaches, pears, plums, cherries
Among the various advantages of this type of convenient products, we can indicate the follow

absence of preservatives, colorants and flavours
long shelf-life even after opening – about 1 week, if kept in refrigerator.
save of time for preparation
70 % fruit dices content with a good distribution and a pleasant optical effect
possibility of personalisations of the product and of the packaging
optimal baking and deep freezing stability
product pumping possibility: drums may be emptied through utilisation of pumps and the prod on line and dosed on the ready paste of the already finished cake
flexible packaging (10 and 20 kg bag in box or 200 kgs bag in drum)
absence of dangerous packing stuff, such as cans – following absence of risks of event – and subsequent easy garbage discharge

Applications:
1. all possible fresh bakery products, such as Danish pastry, strudel, pies cakes
2. ice creams
3. fresh desserts
4. catering

These items do not need to be prepared or processing in any way before **use**: they are ready-to do not need any handling at all.

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New Products from *Theobroma cacao*: Seed Pulp and Pod Gum

Antonio Figueira, Jules Janick, and James N. BeMiller

Theobroma cacao L. (Sterculiaceae), an important tropical rain forest species, is grown for its oil-rich seed, to produce cocoa and cocoa butter. Cocoa seeds are a major cash crop of the tropical world, but prices fluctuate widely and economic hardships occur when prices are low. Despite this, only about 10% by fresh weight of the fruit is commercialized, although several promising commercial products could be obtained from the fruit (Greenwood-Barton 1965).

One strategy to increase income for cocoa growers is to identify and commercialize new products that will not interfere with the main seed crop. In this paper, we review a number of new products that have potential for increasing returns to cocoa growers. These include seed pulp and products from pod husk waste; byproducts from the chocolate processing industry, such as cocoa shell, cocoa cake, and cocoa dust (Abiola and Tewe 1991) are not included.

COCOA PULP

Cocoa seeds are surrounded by an aromatic pulp which arises from the seed teguments (technically an aril). The mucilaginous pulp is composed of spongy parenchymatous cells containing cell sap rich in sugars (10 to 13%), pentosans (2 to 3%), citric acid (1 to 2%), and salts (8 to 10%) (Lopez 1986).

During on-farm processing of cocoa seed (the exportable products), the pulp is removed by fermentation and is hydrolyzed by microorganisms. Hydrolyzed pulp is known in the industry as "sweatings." During fermentation, the pulp provides the substrate for various microorganisms which are essential to the development of chocolate flavor precursors, which are fully expressed later, during the roasting process. Fermentation was once thought to be simply an easy way to remove the pulp to facilitate drying, but its importance to cocoa quality has been well established (Lopez 1986).

The schedules for fermentation vary according to location and season, chamber size, depth of seed layer, and physical turning of the seed. Although pulp is necessary for fermentation, often more pulp occurs than is needed. Excess pulp, which has a delightful tropical flavor has been used to produce the following products: cocoa jelly, alcohol and vinegar, nata, and processed pulp.

Approximately 40 liters of pulp can be obtained from 800 kg of wet seeds. Cocoa jelly is produced by cooking fresh pulp mixed with sugar at the rate of 300 to 600 g to one liter pulp. The pulp contains about 1% **pectin** (Wood and Lass 1985). The jelly has a fruit-acid flavor and is a popular delicacy in Bahia, Brazil.

By controlled fermentation and distillation, sweatings can be made into an alcoholic spirit with 43% ethanol. Alcohol produced can be further fermented by *Acetobacter* sp. to produce acetic acid, but vinegar is not yet a commercial product (Samsiah et al. 1991).

Cocoa sweatings have been shown to be a suitable substrate for fermentation to produce nata (Samsiah et al. 1991), a product usually obtained from fermentation of coconut water by *Acetobacter aceti* subspecies *xylinum*. Nata is processed to an agar-like product, packed in syrup, and is consumed as a dessert in Asia.

Recently, a small industry utilizing fresh pulp has been established in Bahia for a number of tasty products. The pulp can be consumed fresh in the form of juices and "shakes." In small stalls, seeds with pulp are extracted from individual pods and placed, as ordered, in a modified food blender in which a metal disc with holes instead of blades. Milk or water is added, and after a few seconds of blending, the contents are poured through a strainer, producing a frothy, delicious, refreshing beverage. Enough pulp is usually left on the seed for normal fermentation, but pulpless seeds can also be added to intact seed to complete fermentation. Pulp can be preserved by freezing and used for ice-cream, yogurt flavoring, and juice concentrates. Because of the expense of the freezing process, cocoa pulp has not been marketed outside Bahia. It is our belief that this product could have large scale accep-tance, and we recommend market studies in temperate countries.

Extraction of pulp does not interfere with subsequent seed fermentation, and reduction of pulp before fermentation may be beneficial to cocoa quality (Schwan and Lopez 1988). In Brazil, seed quality is improved by the removal of pulp in order to reduce acidity. Commercial depulping machines of various sizes have been developed based on a revolving cylinder, which removes about 60% of the pulp and does not injure the seeds. Bahia alone produces about 300,000 tonnes of dry cocoa seeds. Each ton of dry seeds represents 300,000 t of pulp, of which 60% will be needed for fermentation, leaving an excess of 120,000 t. If only 10% of this quantity would be utilized in Bahia alone, there would be sufficient raw product available to produce 12,000 tons of pulp.

CACAO POD HUSK

Each ton of dry seeds represent about 10 tons of husk (fresh weight). At the present time, pod husks are a waste product of the cocoa industry, and present a serious disposal problem. They become a significant source of disease inoculum when used as a mulch inside the plantation. Fresh or dried husks may be used as livestock feed, but theobromine content (ca. 0.4%) restricts the proportion that can be consumed, and its **use** has been limited. Although acceptability by animals is satisfactory, digestibility is considered poor and dependent on processing cocoa pod husk (Adomako and Tuah 1988). Reports indicate that pod meal can constitute 20% of ration for poultry, 30 to 50% for pigs, and 50% for sheep, goats, and dairy cattle, but these values may be too high (Wood and Lass 1985). The toxic dose of theobromine for rats (LD_{50}) is 1254 $mg \cdot kg^{-1}$ (Abiola and Tewe 1991).

Low digestibility of polysaccharides restrict the **use** of pod husks for methane production in biodigestor (Lopez et al. 1985).

Potassium Salts for Soap

Cocoa pod husks contain 3 to 4% potassium on a dry basis (Wood and Lass 1985). Pod husk ash has been used to make soap in Ghana and Nigeria (Oduwole and Arueya 1990; Arueya 1991).

Cacao Pigment

A cocoa husk extract called cacao pigment, which is a mixture of condensed or polymerized flavonoids (such as anthocyanidins, catechins, leukoanthycyanidin), sometimes linked with glucose, has been utilized in Japanese food industries (Kimura et al. 1979). Recently this extract has been shown to inhibit cytopathic effects of HIV in cell culture (Unten et al. 1991). The anti-HIV activity was attributable to interference with the virus adsorption, rather than inhibition of the virus replication after adsorption.

Pod Gums

In cacao, lysigenous cavities filled with mucilaginous substances occur in roots, stems, flowers, and leaves (Brook and Guard 1952) as well as fruit husks (Figueira et al. 1992). Krishna Moorthy and Subba Rhao (1976, 1978, 1980) also isolated gums from the seed pulp. Polysaccharides of cacao were first characterized by Whistler et al. (1956), who found differences in hot-water-soluble polysaccharides between seed and pod husks. Blakemore et al. (1966) examined the hot-water-soluble fraction of husk polysaccharide and concluded that the major part of this fraction was a pectic material. Cocoa pod husks were examined as a source of **pectin** by mild acid extraction by Adomako (1972) and Berbert (1972), but yields were low and the **pectin** was inferior to apple or **citrus pectin** in gel-forming ability. Krishna Moorthy and Subba Rhao (1978, 1980) found that gums from seed pulp were effective in low concentrations as a **binder** for pharmaceutical pills, and reported that suspending properties were superior to tragacanth, sodium alginate, sodium carboxy-methyl cellulose, and methyl cellulose.

Gum karaya produced from various *Sterculia* species, Sterculiaceae, mainly *S. urens* Roxb., has been used in the food and medical industry (Glickman 1982), but its **use** has diminished because its supply is variable and unreliable. We have recently characterized cocoa gums from pod husks and stems to evaluate their potential as a replacement for gum karaya or as a new commercial product (Figueira et al. 1992).

Yield averaged 1.5% of fresh weight and 8.4% dry weight for stem gum, and 0.7% of fresh weight and 8.7% dry weight for pod gum. Cacao pod gum was closer in composition to gum karaya than was stem gum (Table 1). Both cocoa gums contained the same monosaccharides as gum karaya but with the addition of arabinose and with higher proportions of rhamnose. The major component of stem gum was glucose, not found in the other two gums and also contained more glucuronic acid. Cacao stem gum has a higher viscosity at concentrations below 1% than gum karaya (Fig. 1).

SUMMARY

Unutilized portions of cocoa pods contain many potential new products that could provide extra income for cocoa growers. The most promising products appear to be cocoa pulp and the gums from pod husks. Although cocoa pulp is now essentially a waste product, exploitation will require a considerable investment in freezer processing equipment. Potential uses for pod gums include binders for such products as pet food, emulsifiers, and fixatives. More research is needed to discover economic uses of this product. For maximum efficiency, we foresee a combination of seed fermentation, pulp and gum extraction in a single operation. This may be carried out by medium to large growers in an on-farm operation, or by a cooperative facility that will service small growers.

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Table 1. Sugar comparison of cacao gum and gum karaya.

	Sugar composition (molar ratio)[z]							
Gum source	Rhamnose	Arabinose	Galactose	Glucose	Xylose	Mannose	Galacturonic acid	Glucuronic acid
Gum karaya	1.6	0.0	1.0	0.1	0.0	0.0	1.3	0.6
Cacao stem gum	2.0	1.7	1.0	2.8	0.0	0.0	1.1	1.4
Cacao pod gum[y]	2.4	2.1	1.0	0.1	0.1	0.0	1.1	0.6
Cacao pod gum[x]	1.0	0.3	1.0	0.0	0.0	0.3	0.0	0.0
Cacao pod gum[w]	0.4	0.2	1.0	0.4	trace	0.3	1.3	0.0
Cacao pod gum[v]	0.6	0.4	1.0	trace	0.3	0.0	13.4	0.0

[z]All monosaccharides were standardized for galactose molar concentration.

[y]Figueira et al. (1992)

[x]Whistler et al. (1956)

[w]Blakemore et al. (1966)

[v]Adomako (1972)

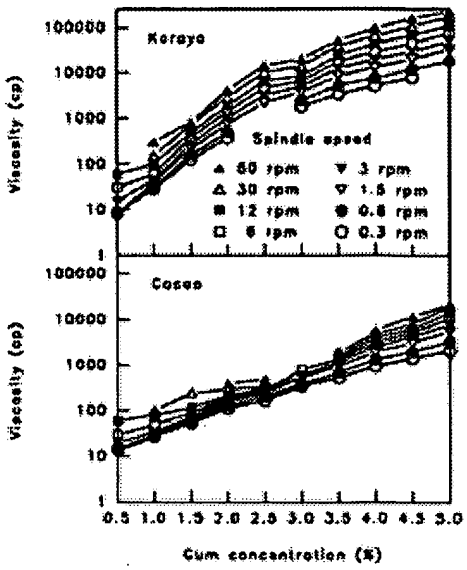

Fig. 1. Viscosity changes with concentration of cacao pod gum and gum karaya at different spindle speeds.

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